

Jupiter's Synchrotron Emission: Unveiling the Jovian Inner Radiation Belts Through Modeling and Observation

S. J. Bolton (1) and S. Gulkis (1)

(1)Jet Propulsion Laboratory, California Institute of Technology

Jupiter's "Van Allen" radiation belts have been the focus of numerous scientific investigations since their discovery in the late 1950s. Initially detected using ground based radio telescopes that observed the synchrotron emission from the trapped energetic electrons, the radiation belts were later measured directly with NASA spacecraft (Pioneer, Voyager, Galileo Probe). Continued ground based observations combined with improved models of the Jovian magnetic field and theoretical modeling have greatly improved our understanding of the radiation belts. Nevertheless, a number poorly understood characteristics and outstanding problems connected with radiation belts remain.

Among the outstanding issues are the reconciliation of the spatial and temporal variability with the theoretical diffusion time and the presence of high latitude isolated emission regions. The spectrum, pitch angle distribution, and high-energy cutoff energies of the energetic electrons remain poorly determined.

In this talk, we will provide an overview of outstanding problems and report on the ongoing work in the scientific community to improve our understanding of Jupiter's synchrotron emission.

The JPL contribution to this paper was performed at the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.